

JPRS-TTP-90-004  
7 MAY 1990



# ***JPRS Report***

## **Telecommunications**

REPRODUCED BY  
U.S. DEPARTMENT OF COMMERCE  
NATIONAL TECHNICAL INFORMATION SERVICE  
SPRINGFIELD, VA. 22161

**DTIC QUALITY INSPECTED 3**

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# Telecommunications

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## NIGERIA

### **\$500 Million Project to Rehabilitate Telephone Network**

*55000062 London AFRICA ANALYSIS in English  
30 Mar 90 p 7*

[Text] Lagos. Negotiations have begun in Washington between the World Bank and Nitel, the state-owned telecommunications monopoly of Nigeria, for a \$200m loan. The loan would be a contribution to a \$500m project to rehabilitate and expand the existing network.

Nitel has already made changes to the tariff structure in line with World Bank conditions for the loan. Increases of 800 percent have been instituted for all international services. The cost of an open line for one year from Lagos to London is N1.7m (\$200,000), making Nigeria one of the world's most expensive nations for telecommunications.

There has, however, been no improvement in network efficiency. Total exchange capacity is close to 400,000 lines but only 250,000 are actually connected. Of the latter, only 60 percent are believed to be in working order at any one time. This leaves Nigeria with a ration

of 0.2 lines per 100 people, far below the World Bank's suggested minimum for a developing country of one line per 100 people.

Within the last two decades, huge sums of money have been invested in the telephone network with little sign of benefit. Typical was the decision in the mid-70s to employ an aerostat balloon, tethered at 14,000ft, to provide a domestic satellite service. Although \$150m is believed to have been spent on the project, the balloon has yet to see the light of day. Sources within Nitel report that various component parts of the project at present being sold off at a substantial loss.

Nitel has also announced that it intends to rehabilitate the 37-storey Necom House, the former centre of external communications which was ravaged by fire in 1983. The cost of rehabilitating what is Nigeria's tallest building has been put at N85m (\$8.5m). The fire started in the accounts department, coincidentally soon after an investigation had begun into the company's finances.

Nitel plans to fund both the rehabilitation of Necom House and a significant proportion of the World Bank-sponsored rehabilitation project from its own resources. But exactly how the revenue will be generated is as yet unclear. Nitel has failed to make a profit in its history.

## INTRABLOC AFFAIRS

### Polish, East Bloc Participation in Eutelsat Discussed

90MI0093 Milan *ITALIA OGGI* in Italian  
20 Dec 89 p 39

[Article by Alberto Toscano: "Poland Joins Eutelsat: The European 'Common House' Begins with Satellites"]

[Text] "By now there are no longer any doubts, Poland will join Eutelsat, negotiations have been completed," Andrea Caruso, director general and head of the European program for telecommunication satellites informed *ITALIA OGGI*. Poland will be Eutelsat's 27th member and the first from the COMECON [Council for Economic Assistance].

Eutelsat owns and operates telecommunications satellites in Europe while those satellites that connect the Old World with the outside rely on Intelsat which has its headquarters in the United States. Warsaw's entry will be approved on 28 February by the organization's assembly which is composed of representatives from the governments of all the member countries. Hungary and Bulgaria should be the next to join Eutelsat. The GDR and Czechoslovakia with whom talks have already begun may come next. This means that in the coming years telephone communications with eastern Europe will be greatly facilitated.

Andrea Caruso stated: "In the field of telecommunications, Europe is truly destined to become a common house." Even more so if the Soviets are willing to combine Eutelsat cooperation with their Intersputnik program. Intersputnik is a system which services primarily long distance communications (which AT&T has already proposed to link with the U.S. telecommunications system. "Eutelsat," noted Andrea Caruso "currently has four operating satellites. Another five are in the final development phase. The capital invested in the satellites currently in orbit is \$300 million. The amount invested in the next five satellites to be launched at the beginning of the 1990's is \$600 million including the expenses for carrying them into orbit." Satellite launching is a particularly sensitive point for Caruso. The Eutelsat satellites today would number five if three

years ago one of these did not go up in smoke with an Ariane missile that exploded at takeoff. "That was an extremely difficult moment for us," stated Caruso, "and I decided right then to diversify by negotiating and later signing a contract with the U.S. General Dynamics to launch our satellites into orbit with the U.S. Atlas Centaur missiles. Our next satellite—the first of the new generation—will be launched next April with an Ariane missile and then another satellite will be launched in November thanks to General Dynamics." Caruso was bitterly attacked by the French, who were determined to support the Ariane program for reaching an agreement with the United States, even if only for diversification purposes. However, Eutelsat replied that diversification is a way to protect oneself and not at all a betrayal. This is demonstrated by the fact that Eutelsat/Ariane cooperation has not decreased, even if Caruso has some complaints to make about the European launcher program. "Why does an Ariane launch cost 12 to 13 percent more than an Atlas Centaur launch? These things would make sense if we were alone aboard Ariane and with company on Atlas, but the truth is the exact opposite. Being alone on Atlas puts us in a much more flexible position while the presence of another satellite on Ariane risks delaying our time schedule."

According to Caruso, Eutelsat's experience shows, the enormous importance achieved by satellites. Eutelsat currently accounts for 10,000 telephone circuits which service primarily the outlying areas of Europe. "Beyond a thousand-kilometer distance," affirms Caruso, "a phone call becomes more convenient via satellite. For example, this system is currently in use in communications between Paris and central and southern Italy."

Eutelsat means finally, and above all, television. Seventy percent of its turnover comes from television. Renting a channel from one of Eutelsat's satellites for international use costs \$2.8 million per year. "The growing importance of television pushed us," says Caruso, "to orient our future satellite programs in this direction. These will be more important than current programs. However, while not being exactly 'direct telediffusion' they will serve a particularly wide-ranging clientele. Their emissions will be received by parabolic antennas with a diameter of 60 to 80 centimeters. In practice, it is like saying that the difference between 'direct diffusion' satellites and traditional satellites will tend to diminish."

## INDIA

### India Joins Study for Submarine Cable System

55500060 Bombay *THE TIMES OF INDIA* in English  
27 Feb 90 p 17

[Text] Bombay, 26 Feb—For studying the feasibility of a fibre optic submarine cable system linking South East Asia, the Indian sub-continent, Middle East and Western Europe, the Videsh Sanchar Nigam Ltd (VSNL) has signed a Memorandum of Understanding (MOU) with Indonesia, Republic of Djibouti, United Arab Emirates, Egypt, Singapore, France and Italy.

Giving this information at a press conference today, Mr V. Babuji, acting chairman and managing director, VSNL said that Saudi Arabia would be signing the MOU shortly.

The project is called SEA ME WE 2 (acronym for South East Asia Middle East and Western Europe Cable System 2). SEA ME WE 1, an analogue cable is already working between Australia and Western Europe via South East Asia and Middle East.

The new system is expected to be implemented with a technology using the third window at 1.55 micro meter with a bit rate of 560 MBITS per fibre pair.

Once the feasibility is established this MOU will be followed up by a Cable and Maintenance Agreement for actual implementation.

The projected date for the implementation of the cable is the end of 1994. The approximate cost of this project is U.S.\$77 million and India's share is likely to be around 12 per cent amounting to Rs 140 crore in foreign exchange.

There are high capacity optical fibre submarine cable systems both in the Atlantic and Pacific Ocean Regions. In the Indian Ocean however there is a weak link since there are no high capacity fibre optic cable system.

With the proposed SEA ME WE 2 cable, there will be a girdle around the globe of all high capacity fibre optic cable system, Mr Babuji said.

### Planned Satellite Launchings To Aid Development

#### Monitoring Targets

55500059 Bombay *THE TIMES OF INDIA* in English  
7 Mar 90 p 7

[Text] New Delhi, 6 Mar (UNI)—The department of space has launched a specific action plan for 1990-95 aimed at improving the quality of life, particularly in the rural sector, and to provide vital inputs for achieving rapid national development in a cost-effective way.

The plan consisting of 32 projects lays special emphasis on poverty alleviation, water management and land use

and is being implemented in a time-bound manner in collaboration with several user agencies at Central and state levels.

The Indian space programme primarily aims at achieving self-reliant programmes to provide nationwide services in the areas of communication, satellite-based natural resources survey and management, and meteorological services.

The space-based communication and meteorology is planned around a series of INSAT satellites towards providing telephone, television, education, mass communication, disaster warning and weather services.

The space-based remote sensing programme has been planned around a series of Indian remote sensing satellites (IRS) towards establishment and operationalisation of the national natural resources management system (NNRMS).

The second generation INSATs, to be launched from next year onwards, will begin with the IRS-1B in June, the IRS-1C, in 1993 and IRS-1D in 1995. These are expected to ensure continuous services in these areas.

All-India landuse cover mapping for agro-climatic zones, acreage and production estimation for major crops, mulberry crop inventory, soil resources mapping, desert locust migration monitoring wildlife habitat mapping, monitoring of Jharia-Raniganj underground coal fires, ground water potential zone mapping and agricultural drought monitoring are among the 32 projects under the action plan.

Surface water mapping, prioritisation of watersheds in the Brahmaputra basin, flood management of major river basins, coastal wet land mapping, survey of environmental impact of major river valley projects (Thri, Narmada, Silent Valley), site locations for mini/micro hydels for power and irrigation development, digital terrain modelling and continuation of INSAT services are also part of the action plan.

Meanwhile, the department plans to extend the agricultural drought assessment and monitoring to all the drought-prone states for both kharif and rabi seasons. This monitoring is at present done at the district level for 10 drought-prone states in collaboration with the department of agriculture and co-operation (DAC) and other agencies.

Seventy more districts are expected to be covered shortly by the wasteland mapping project.

Under the ground water potential zone mapping programme, mainly aimed at providing drinking water sources to 2,27,000 [as published] problem villages, 75 per cent of the country has been covered using satellite imageries. The remaining areas are to be covered by the end of this year.

### More on Launchings

55500059 Madras *THE HINDU* in English  
3 Mar 90 p 9

[Text] New Delhi, 2 Mar (PTI)—INSAT-1D is scheduled to go into orbit on 12 June this year.

In the fourth of India's first generation INSAT-1 series, INSAT-1D's antenna system was damaged when a crane pulley fell on it when it was being mated with the Delta launching rocket in the United States last summer.

"Indian space scientists are testing the antenna system and the satellite will be ready for launch in June this year," Prof U.R. Rao, Chairman of the Space Commission, told PTI after giving a talk on "space technology for the development of the country" at the Delhi University on Thursday.

Scientists at the Indian Space Research Organisation (ISRO), Bangalore, have not yet been able to re-establish telecommunication links with INSAT-1C which lost the earthlock in November last year.

"Although we have not lost contact with it, we have not been able to use it," Prof Rao said.

### Second and Third Generation INSATs

Prof Rao said the second generation satellite INSAT-2 would be launched by the end of next year. The INSAT-2 series will comprise five satellites, the last of which is planned to be launched in 1997. It is expected to have twice the capacity of INSAT-1 series, which has covered over 90,000 route km for telecommunications, besides providing access to television for 80 per cent of the country's population and helping in accurate weather forecast.

The third generation INSAT-3 series is expected to be launched by the turn of the century. The second Indian Remote Sensing Satellite, IRS-B, would go into orbit in June next year which might also see the launching of India's first Polar Satellite Launch Vehicle (PSLV).

IRS-A, the country's first remote sensing satellite, launched in 1988, helps in extensive land surveys and accurate estimates of wasteland distribution, ground-water potential and crop acreage, flood and drought monitoring and snow melt prediction.

### ASLV Launch in 1991

ISRO scientists are also hopeful of rectifying some of the errors that have led to failures in launching the Augmented Satellite Launch Vehicle (ASLV) in the past. "We hope to have a successful ASLV launch in 1991," Prof Rao added.

While India is on par with the advanced countries in satellite and remote sensing technology, it is yet to perfect the development of its own satellite launch vehicles.

Earlier, delivering the Veda Thakurdas memorial lecture at the Delhi University, Prof Rao stressed the importance of space technology for development. "It can help to transform society by providing TV communication, radio signals, disaster warning systems and linking remote rural areas to the mainland," he said.

Dr Veda Thakurdas was the first founder-principal of Miranda House, Delhi University's first residential women's college.

## OMAN

### Organization Reports New Projects

55004512A Muscat *TIMES OF OMAN* in English  
29 Mar 90 pp 1, 2

[Article by Bala Menon: "Telecom Triumph"]

[Text] Ultra-modern digital telephone exchanges, satellite earth stations, near-saturation telecommunications coverage of the country and widespread availability of public call offices are some of the highlights of on-going and new projects of the General Telecommunications Organisation.

In an exclusive interview with the "Times", Nur Muhammad bin 'Abd-al-Rahman, Executive President of the GTO, said among major works slated for completion in 1990 were the link-ups in the Southern Region and the Batinah Coast.

"The coverage of the Batinah region will be 100 percent right up to the Sultanate's border with the UAE [United Arab Emirates] and there will not be a settlement or village without direct accessibility to a modern telecommunication device."

The scheme entails the construction of some 15 exchanges, with the latest equipment.

Fibre optics is the newest technology available in the sector and all new transmission links in Oman would be through fully digitised exchanges. A fibre optics line will soon connect Muscat with Ibri, linking up with exchanges all along the way.

Mr Nur Muhammad said another venture would also be launched soon to expand exchanges in the Muscat region to cope with future demand.

"Also to begin this year is the first phase of the Fanjah Nazwa telecom link, which will be similar to the Batinah Coast project.

"We expect GTO services to cover the entire country by the end of the coming Five-Year Plan. After the infrastructure work is completed, we have only to fill in the pockets..."

The GTO is also making heavy investments to bring its services into direct contact with the people and in this

regard some 200 sophisticated card-phone booths and 350 coin-operated boxes have been installed in several parts of the country.

"Orders have now been placed for an additional 1,000 card-phone units and 500 coin-operated phones to enable near-saturation coverage of most areas."

A lot of equipment has also been ordered to supply the mobile telephone network which is becoming increasingly popular with businessmen and executives because of its excellent cost-benefit ration. A novel package switching service for data exchange between commercial organisations is now being made available.

One of the success of the GTO has been the smooth induction of the facsimile into everyday life in the Sultanate. "We had foreseen the decline of the telex several years ago and had made preparations to the end," Mr. Nur Muhammad said.

Telefax has been 'delicensed' in the country, allowing subscribers to purchase machines from any dealer they chose and getting them installed themselves.

"The GTO has even waived the royalties it used to get from companies. and although, this could result in a temporary loss in revenue, it is expected to be made up by the additional use of the service."

The Sultanate of Oman is a major user of Arabsat, the satellite launched by the Arab Satellite Organisation. There are two earth stations at al-'Amirah, one for international telecom links and one for use in the domestic phone and television network. Mr. Nur Muhammad said since more satellite facilities were needed by the country, al-'Amirah also had a station tagged on to Intelsat, a satellite above the Indian Ocean.

Another station is to be built at 'Ibri to work with another Intelsat above the Atlantic Ocean.

#### Tariffs

Regarding the tariff structure of the GTO, Mr. Nur Muhammad said GTO was continuously monitoring both domestic and international rates. "Lower tariff generally creates more demand and our policy has always been to lower the tariff as much as possible."

The reduction in international rates announced recently and the streamlining of the rates structure last year has had a good impact.

Free local calls were no possible. "Some countries do not charge for local calls because they cannot technically meter such calls as their equipment was installed much earlier than ours. Oman has the latest technology available and this makes us able to charge for all calls and additionally make our international calls cheaper."

The Sultanate of Omar, Bahrain and Saudi Arabia have similar multi-metering system and hence the same tariff structure.

The GTO is a commercial entity and "we are very proud that we have been successful. We make good profits which are reinvested in newer equipment and better services."

One of the services so offered is the detection of nuisance calls. The GTO has the specialised equipment needed and all that an affected subscriber need do is to contact the nearest police station. "We will do the rest".

Among the plans for major future projects is one to build regional telecommunications centres—similar to the tower at Bayt al-Falaj, although not so large. These centres will have remote maintenance systems that will monitor surrounding exchanges.



## EUROPEAN AFFAIRS

### CCETT Builds HDMAC Circuit, Encoder Parts

90AN0156 Paris *FRENCH TECHNOLOGY SURVEY* in English Dec 89 pp 1-2

[Article: "EUREKA 95 (HDTV) Project"]

[Text] The main aims of the EUREKA HDTV project are to formulate a system of standards for the gradual introduction of high-definition television (HDTV) in countries using 50 Hz television systems, and to use these proposals for the production of a complete range of prototype equipment for production (cameras, etc.) broadcasting (the HDMAC [High- Definition Medium Access Control] system) and display (direct or projection receivers).

The principal feature of the European approach to high-definition television broadcasting is the search for compatibility. HDTV transmissions are broadcast as a 625-line signal, known as HDMAC, which can be received on D2-MAC/packet receivers, and by high-definition receivers which restore the full quality of the 1,250-line picture.

The Joint Broadcasting and Telecommunications Research Centre (CCETT) in cooperation with the Rennes electronic laboratories of Thomson-CSF, recently built the estimator and change equaliser for the HDMAC encoder. These devices compute a characteristic time displacement vector for every picture and at every point in the high-definition picture.

CCETT also supplied a new version of the D2-HDMAC/packet transmission circuit. This circuit performs—at the ends of a transmission-broadcasting channel (by satellite or cable, for example)—the multiplexing/demultiplexing of the information constituting the high-definition television signal, in the form of a 625-line signal.

The signal consists of:

- video signals, in digital form, from the passband reduction equipment,
- six audio channels (main stereo channel, two background audio channels, and two commentary channels in two different languages),
- data (service data and "digital assistance" data for refining the restoration of the 1,250-line high-definition picture).

### Europe Abandons Plan for MDNS Data Network

90AN0153 Brussels *TECH-EUROPE* in English Jan 90 pp 4-5

[Article: "Competition: Pan-European Public Telecommunications Venture Abandoned"]

[Text] Plans by 22 telecommunications administrations for a pan-European data network service have been

abandoned. MDNS (Managed Data Network Service) was no longer viable, the parties concluded, clearly a consequence of an enquiry by the European Commission, which feared certain elements of the deal would distort competition in the sector. Explaining its position on December 14, the Commission stated that the joint venture "presented certain risks of restriction of competition, not only between the operators themselves, but also from private service suppliers" because of the telecoms administrations' monopoly in the network infrastructure.

The telecoms administrations, or Recognised Private Operators Agencies in some cases, sought to provide a system whereby the user would have had access to European-wide services in data management and other value-added data communication services through a single operator, to be based in the Netherlands. This would have benefited the user and could have accelerated standardisation across Europe, the Commission stated, but would have to respect certain parameters laid down by the EEC Treaty's bans on restrictive practices and abuses of dominant market position (Articles 85 & 86). Discrimination that would have resulted against the private service suppliers and cross-subsidisation concerned the Commission, and the parties must, therefore, have felt a dilution of their plans to accommodate such issues was not plausible. The main contenders in the project were the German firm AEG Aktiengesellschaft and Heated NV as well as the Finnish company Oy Noka AB.

### EC Examines Telecom Equipment Trade

90AN0081 Paris *TELEMATIQUE MAGAZINE* in French Oct 89 pp 14-16

[Article by Herve Marchal: "Watch Out, Europe!"]

[Text] The EC's balance of trade in telecommunications equipment is still favorable, but is definitely declining. Watch out—a gap is forming with respect to Japan! Fortunately, dynamic trade continues to increase within the Community. The following is an examination of an in-depth study by EC Directorate General [DG] XIII.

The moment of truth is approaching for European countries, such as France and Germany, whose policy for too long has been the slogan: "It is urgent that we wait." The agenda for the fall of 1989 and the first 6 months of 1990 will give impetus to the building of a genuine EC-wide telecommunications sector and make everyone aware of his responsibilities. First of all, there is the Council of the European telecommunications ministers meeting to be chaired by Paul Quiles on November 8, and then the deadline of April 1990 for the first firm commitments to deregulation. In this context, the study that has just been completed by two experts of DGXIII (in charge of telecommunications, information, and innovation industries), Richard Cawley and Paul Verburgt, is timely.

### **Deterioration in Our Trade Balance**

The study, which focused on EC imports of telecommunications equipment in 1988, takes such a shocking look at the deterioration in our trade in general, and with Japan and the United States in particular, that we considered it essential to publish the principal data and the most significant tables. We therefore asked Claude Vincent, a shrewd observer if ever there was one, to comment freely on this report.

The main revelation of this study is that the traditional trade surplus of the EC in the field of telecommunications equipment is about to melt away like snow in the sun. It declined from ECU 1.2 billion in 1986 and 1 billion in 1987 to just 100 million in 1988. However, this accelerated decrease is not so sudden as it may appear at first sight. It is partially explained by a new definition of the elements that make up this sector.

Nevertheless, the other conclusions to be drawn from this report do not inspire optimism. For instance, the trade gap with Japan, which is almost three times greater—ECU 1.169 billion (the ECU has an average exchange rate of Fr 7)—than the deficit with the United States (ECU 408 million), has become a real gorge. And our surplus with respect to the non-EC West European countries (ECU 88 million) covers only half the accumulated losses with the countries of Southeast Asia (ECU 156 million). Fortunately, our trade with the rest of the world (Middle East, Africa, and Latin America) continues to yield a major surplus (ECU 1.74 billion). This is small comfort, considering that our total exports (apart from Japan and the United States) dropped by almost ECU 1 billion in 1988 (from ECU 4.2 to 3.3 billion). One last item of this general overview: 16 percent of the EC's production of telecommunications equipment is exported, compared with 11 percent of total industrial production. This underlines the extent to which the telecommunications industry is open to international trade. In other words, more than other sectors it must meet the challenge of competition that has become truly worldwide. Although the challenge is worldwide, the major problem comes from Japan, with which our trade has deteriorated steadily since 1982. Losses have increased markedly since 1986, from ECU 700 million to ECU 1.2 billion in 1988, with about 56 percent of this enormous trade deficit caused by large-scale importation of telefax machines. In order to understand how impressive the gap between us and the Japanese is, one should know that they exported to Europe 25 times more equipment than we exported to them! Our situation with respect to the United States appears almost reasonable by comparison: The trade deficit from transmission equipment and terminals amounts to only ECU 408 million.

Our overall trade balance with the rest of the world remains favorable, with our surplus amounting to ECU 1.74 billion, which is, however, a decrease of ECU 900 million. But it is important to emphasize that the non-EC countries of Western Europe continue to be the EC's

main trading partners. Their imports from the EC (mainly transmission equipment and terminals) amount to ECU 1.038 billion and their exports to the EC (mainly switching equipment) to ECU 950 million.

The share of each EC country in these results depends, of course, on the strength of its industry and of its trade activity and on the quality of its research. In this game, the FRG takes the lead, followed by France, with Britain third. West Germany and Britain have the largest deficits with respect to Japan, while France has been spared until now because of its greater protectionism, especially as regards telefax machines. In all, only 5 out of 12 countries (the FRG, France, Belgium, Luxembourg, and Ireland, in that order) have a trade surplus. Britain has the largest deficit (ECU 500 million).

### **Stabilization of Losses With Respect to the United States**

These are the shocking figures that should induce our political leaders and corporate executives to double their efforts to ensure that the telecommunications industry—which is one of the real assets of the EC economy—does not lose any more market share. The measures adopted during the next 8 months will therefore be crucial. Nothing has been lost: For example, we have succeeded in stabilizing our losses with respect to the United States. The FRG has even managed to score a surplus in its trade with Uncle Sam. However, the hemorrhaging due to Japan must be stopped. It is possible, but it will be a drawn-out battle, which is one more reason to begin it right now: We should not think that the EC does not know how to fight or design effective strategies.

Our internal market has thus become the most dynamic commercial pole of the Western world. Witness trade within the EC: It increased from ECU 2.9 million to over 3.3 billion from 1986 to 1988. During the same period, imports from non-EC countries have decreased substantially, from ECU 4.6 billion in 1987 to ECU 3.8 billion in 1988. And these figures do not include the very important trade links developing between the EC and the other West European countries. In any case, here is the proof that the integration of Europe is succeeding. This success must be accelerated and amplified.

### **[Box, p 16]**

#### **Three Lessons From a Report**

TELEMATIQUE MAGAZINE asked Claude Vincent, recognized expert and industrialist who has been watching the telecommunications world for more than 40 years, to comment on the DG XIII's report. According to him, there are three major lessons to be learned from this study.

#### ***Deregulation Not the Source of the External Deficit***

If introducing competition to the telecommunications services—called somewhat hastily “deregulation”—were a destabilizing influence on the producing companies of

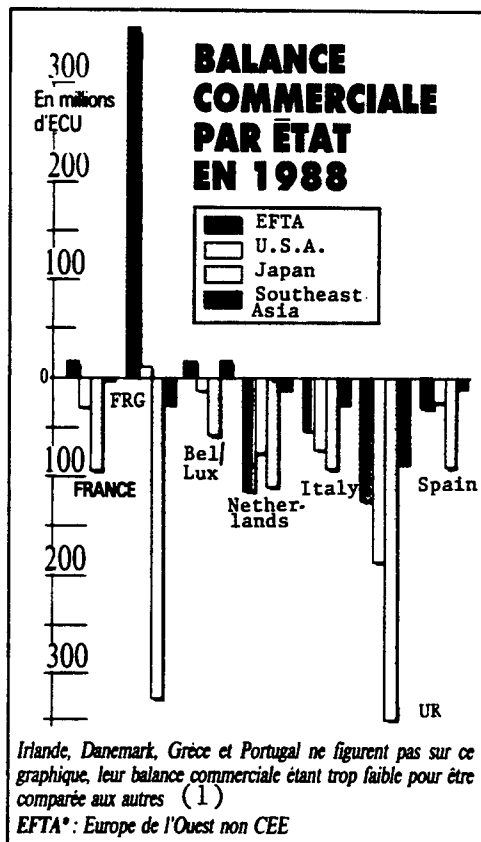


Figure 1. Trade Balance by Country in 1988

Key: 1. Ireland, Denmark, Greece, and Portugal are not shown in this graph, because their trade balance is too small for comparison with the others. EFTA [European Free-Trade Association]: Non-EC West European countries

the country, there would be no surplus in the foreign trade of the United States and Japan. In fact, it was these two countries that introduced the hottest competition in rapidly advancing services, i.e., long-distance communications and new services. The case of Britain and its trade deficit in telecommunications is often mentioned and attributed to the privatization of British Telecom and the competition created by the Mercury network. On the contrary, the excessive rigidity of the system established between the British Post Office and its suppliers resulted in the loss to British industry over a decade of all

the foreign markets that had been opened to it by the British Empire.

#### *Ambiguity of Nationality*

How can we explain the steady deterioration of EC trade in telecommunications equipment while EC companies in this sector are in the forefront? How do we reconcile the fact that Ireland, which does not have a national champion, has a favorable trade balance, whereas the Netherlands, the United Kingdom, and Italy, each of which has a champion ranking among the top 20 companies, have negative trade balances? The reason is that there is no longer any correspondence between the nationality ascribed to an industrial group, according to its shareholders, and the territories in which the wealth is created that contributes to foreign trade and employment.

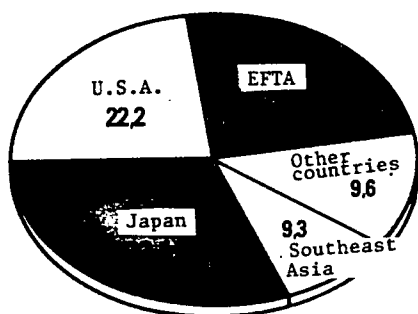
We have become accustomed to assigning a nationality to our companies—French, U.S., British—according to poorly defined criteria. But whereas this classification was logical as long as the nationality of the owners coincided with the nationality of workers, and both with the nationality of the territory on which production took place, there is no longer any rational basis for this classification. Now that the market, and in particular the capital market, is becoming a world market, the correspondence between ownership and nationality poses problems that come to light when statistics on trade take into account the activity of companies established within our countries, but not the activity of companies controlled by capitals considered resident in our countries.

#### *Telefax, Failure of Our Culture*

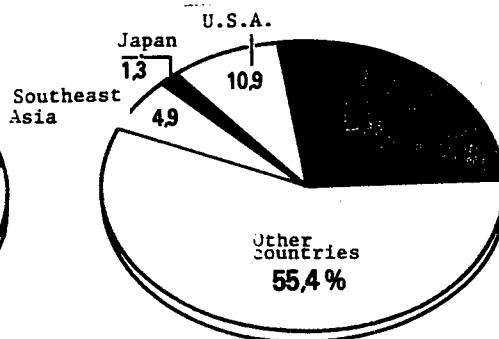
The DG XIII report tells us that half of the EC trade deficit with Japan is caused by the importation of telefax machines, and the success of this product is not about to slow down. Is this not a Western strategic failure rather than a Japanese technological victory? With sequential and linear writing and a small number of characters, Westerners had an information structure that established the supremacy of Western cultures. Transmission of digital data was remarkably well suited to carrying, at very low cost, information written in alpha characters. On the other hand, Asian civilizations suffered from a heavy handicap caused by their ideogrammatic writing systems. It is amazing how this handicap has been turned around and how the need for transmitting graphs, which require large volumes of information, led to the victory of telefax over teletext: more of a marketing than a technological victory.

## LES ECHANGES DE LA CEE EN 1988

IMPORTS ECU 3,686 million (1)



EXPORTS ECU 3,782 million



(1) MECU: million d'Ecu (1 Ecu=7 francs)  
EFTA: pays européens de l'Ouest non CEE  
ASIE du Sud-Est: Corée du Sud, Taiwan, Hong Kong, Singapour

(Source: "Intra-EC and Extra-EC Trade Flows in Telecommunications Equipment in 1988" DG XIII, Bruxelles)

Figure 2. EC Trade in 1988

Key: 1. MECU: Million ECU (1 ECU = Fr 7)—EFTA [European Free-Trade Association]: Non-EC West European countries)—Southeast Asia: South Korea, Taiwan, Hong Kong, Singapore

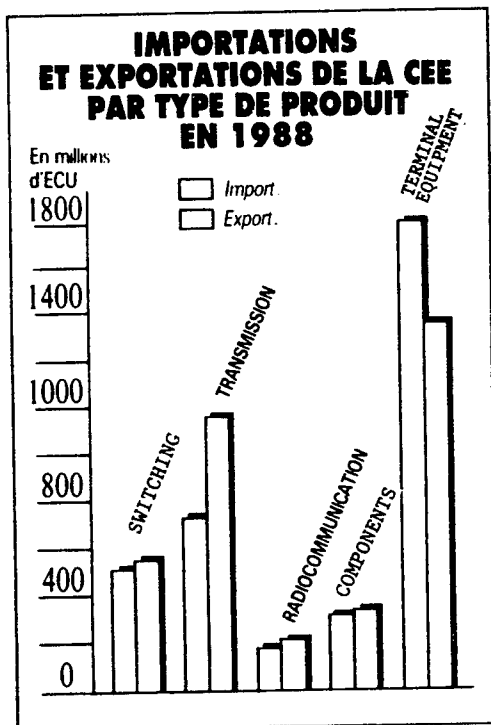


Figure 3. 1988 EC Imports and Exports by Type of Product

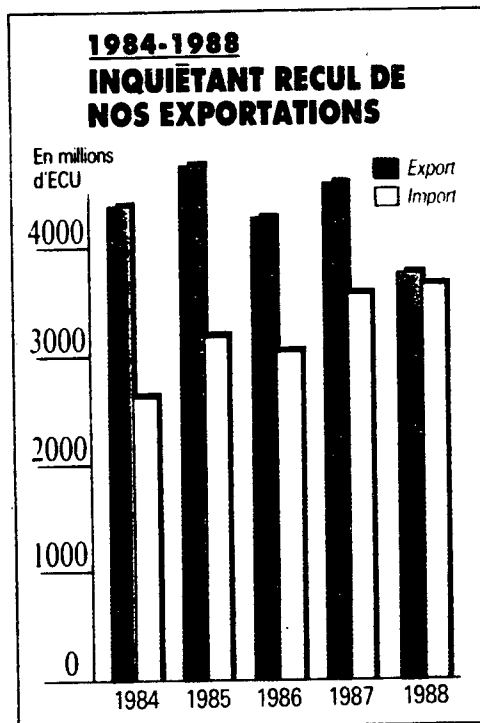


Figure 4. 1984-1988—Alarming Decrease in Our Exports

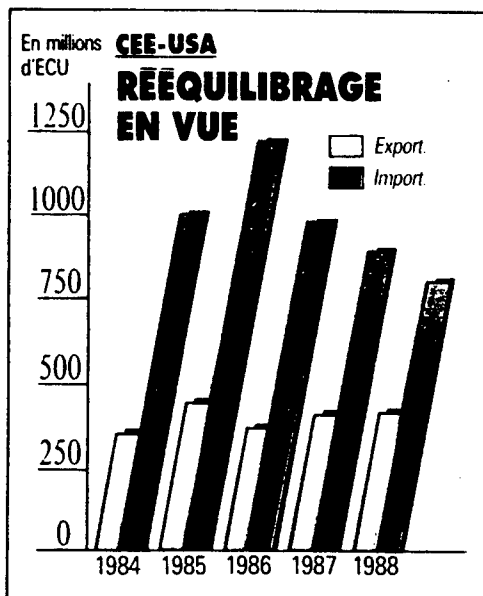


Figure 5. EC-USA—Equilibrium in Sight Again

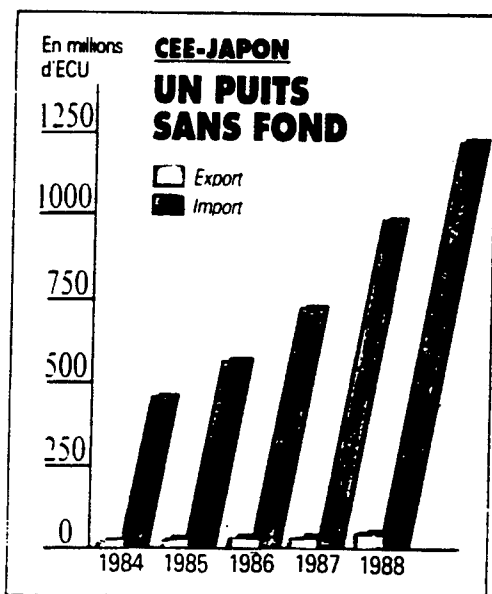


Figure 6. EC-Japan—Bottomless Pit

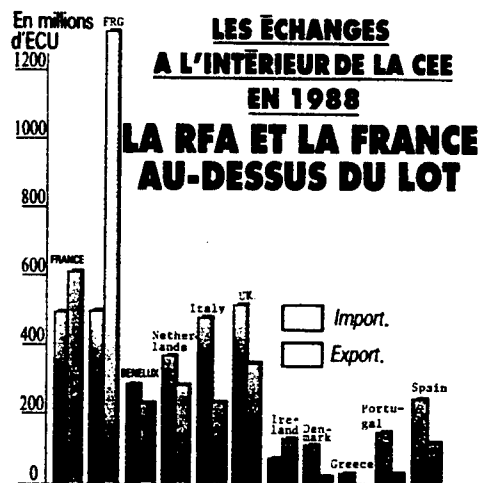


Figure 7. Intra-EC Trade in 1988—FRG and France Lead the Pack

## CANADA

**Bell Canada to Increase Spending on Upgrading Network**

55200037A Toronto *THE GLOBE AND MAIL*  
in English 27 Mar 90 p B10

[Article by Lawrence Surtees: "Bell Plans 25 Percent Increase in Spending for Telecommunications Improvements"]

[Text] Bell Canada says it is planning a 25 percent spending increase on upgrading its telecommunications network over the next five years.

The increase is forecast in the utility's annual five-year capital spending budget filed with the Canadian Radio-Television and Telecommunications Commission.

Bell wants to increase its spending on its network to \$2.5-billion for the 1990-94 period, compared with the \$2-billion for the 1989-93 period forecast in last year's revised budget.

The utility arm of Montreal-based BCE Inc. plans to spend \$12.44-billion on all its capital programs during the next five years, a 3.7 percent increase from the \$12-billion forecast a year ago.

But the bulk of the total increase is earmarked for spending on network programs, including new fibre-optic long-distance lines and digital computerized switches used to route subscriber telephone calls.

Bell serves almost seven million subscribers in Ontario, Quebec and the Northwest Territories. Bell president Jean Monty said last week that the network improvements result in productivity and economic savings, which allow the company to reduce the prices for long-distance services. He announced a \$75-million proposed cut a long-distance rates.

The company stated in its filing that it will need to spend more than \$8-billion to keep up with growing demand for telecommunication services. The utility predicts it will handle more than two billion telephone calls in 1990, compared with the 1.5 billion calls handled last year.

Bell is planning a major increase in spending for fibre-optic lines, which use hair-thin strands of glass to transmit messages via laser-generated light waves instead of bulkier and more expensive copper wires that relay electrical impulses.

The company forecasts it will spend \$830-million on fibre optics between 1990 and 1994, compared with the \$625-million forecast last year. Bell plans to spend \$224-million of the new total this year, most of it on building second fibre-optic links between Ottawa and Montreal and Ottawa and Toronto.

Northern Telecom Ltd. of Mississauga will also continue to benefit from Bell's spending on its digital switch upgrade program. Bell plans to spend \$224.8-million this year on installing new computer switches.

The utility plans to add an average of 660,000 new digital telephone lines to its network in each of the five years covered by the new budget forecasts. Bell added 450,000 digital telephone lines to its network last year and hopes to have every telephone on its network hooked up to computerized switches by 1995.

**Federal Disputes With Provinces Stall Regulatory Bill**  
55200036A Toronto THE TORONTO STAR in English  
22 Mar 90 p C10

[Article by Philip DeMont: "Federal Disputes With Prairies, Quebec Stall Telecommunications Bill"]

[Excerpt] Ottawa's disputes with the Prairie provinces and Quebec over how to regulate Canadian telephone companies have stalled federal plans to introduce new telecommunications legislation.

And, depending upon the outcome of negotiations, residents in some provinces could wind up paying more for less phone service.

The Prairie provinces are pushing for extra powers to run their telephone companies. But Ottawa wants to establish a single regulatory regime under the command of the Canadian Radio-television and Telecommunications Commission (CRTC).

Lately, Quebec has jumped into the fray, claiming substantial regulatory powers at Ottawa's expense.

Caught in the middle are telephone companies and their customers.

"It's the existing business base that is suffering," said Joe Schmidt, CNCP Telecommunications Ltd.'s vice-president of government and regulatory affairs.

The disputes revolve around the design of Ottawa's proposed telecommunications act.

Federal Communications Minister Marcel Masse's long-promised legislation aims to update laws governing how Canadians call across the country. As well, the new rules also would give Ottawa jurisdiction over the three Prairie provincial telephone companies.

In 1989, the Supreme Court of Canada ruled Ottawa had responsibility for these companies. But, when the federal government attempted to pass a bill cementing its hold over telephone regulations, the provinces cried foul. By hiding this provision in his telecommunications bill, Masse may have smoothed ruffled provincial feathers.

According to Prairie officials, however, their worries remain even with new legislation.

"We definitely need to have regional sensitivity," said Darryl Levy, special assistant to Manitoba's minister of telecommunications, Glen Findlay.

Levy and his counterparts in Saskatchewan and Alberta are concerned that any new law may allow the CRTC to make major decisions affecting western phone users without regard to provincial differences.

Instead, they want each Prairie province to have its own live-in CRTC commissioner.

"We've got to have a say in these things," said Doug Smith, Saskatchewan's deputy minister for telephones.

But Ottawa wants to appoint only one commissioner for the entire region, something Saskatchewan and Manitoba are resisting.

Both sides said disputes surrounding the number of CRTC commissioners and other sore points are solvable.

"There are virtually no differences," said James Edwards (PC-Edmonton Southwest), Masse's parliamentary secretary.

Unfortunately for Ottawa, Quebec's minister of communications, Liza Frulla-Hebert, has complicated discussions. She wants the federal government to give Quebec more control of phone companies in her province.

Now, Masse may be forced to talk tough with Quebec over telecommunications, even as the Meech Lake constitutional accord deadline looms closer. But, some analysts noted, he appears unwilling to confront the Bourassa government. [passage omitted]

## FRANCE

### New TV Channel for Africa Announced

LD1804191390 Paris International Service in French  
1230 GMT 18 Apr 90

[Text] A new television channel for Africa should begin broadcasting at the end of this year. Canal Horizon, the successor to Canal Plus Afrique is launching its programs

with 15 hours a day during the week and 24 hours a day over the weekend. Canal Horizon will be coded, in other words a decoder will be needed to receive it, but it will not be free. Despite the crisis which is currently affecting Africa the promoters of Canal Horizon are optimistic. They believe that the new channel can be viable. Paul Fes:

[Fes] Canal Horizon has given itself a subtitle: the southern axis of Canal Plus. Canal Plus, a paying French channel, enjoys enormous success with more than two million subscribers. The money is pouring in and for more than a year now Andre Rousselet, the chairman and managing director of Canal Plus, has been looking outside mainland France and in particular toward the south. Hence we have the birth more than a year ago of Can Plus Afrique, which made contacts in many countries.

Today SOFIRAD is joining Canal Plus to push the project further. The name will change, a chairman is to be appointed. Herve Bourges is managing Canal Horizon and the program will come from Canal Plus and will show basically sports and movies, 400 movies a year. In each country a local company will be formed with a majority of national capital and this local company will receive the Canal Plus signal and will then retransmit it, with a further possibility of adding national programs. Canal Horizon hopes thus to provide an outlet for African production, thanks to reinvestment on the spot of resulting profits.

It will cost about 10,000 CFA francs a month or 20 Tunisian dinars. Tunisia in fact could be the first to be served, from next year, with Gabon and Senegal. Negotiations are also underway with Cote d'Ivoire, Algeria, Egypt, and Cameroon.

#### **Grants Viewed in High-Definition TV Field**

90WT0063A Paris LA TRIBUNE DE L'EXPANSION  
in French 28 Feb 90 p 1

[Article by Jacques Jublin: "High-Definition Television: France Wants to Boost Thomson, While Putting Order Back Into Audiovisuals"; first paragraph is LA TRIBUNE DE L'EXPANSION introduction.]

[Excerpt] The government is thinking of awarding Thomson large grants over the next three years in order to win the TVDH [High-Definition Television] wager. But there is a need for coordination among satellites, cable, and radio relay systems, by specifying the roles of Canal Plus, A2, and Seven.

The French Government is determined to lead the battle for high-definition television without meeting any resistance, to prevent Europe from sinking under the Japanese technological thrust.

So conflicting are the interests involved that Roger Fauroux has decided to handle personally that industrially and politically "sensitive" dossier. The more so as Francois Mitterrand is following closely from the Elysee what he regards as one of the major leading industrial programs for the future Europe. French voluntarism should set out to support Thomson heavily to enable the

nationalized company to develop TV sets and semi-conductors as well as the studio equipment needed to popularize high-definition television as of 1995.

To succeed in this endeavor, it is said that the government, which is currently reviewing the matter very intensively, intends to secure a great many equity grants for Thomson, amounting to Fr2 billion, over a three-year period, if not five, if need be. This would be in addition to the Fr2 billion appropriation already allocated for the group in the 1990 budget.

It also intends to ask that European research credits for audiovisuals be doubled as part of the Eureka program, raising them to Fr4 billion over a three-year period, or double the amount allocated for the initial phase which is coming to an end in mid-June. The financial commitment is so large that, between now and the end of March, the government will have to hold an interministerial meeting to decide about it. The meeting will officialize France's desired role as a leader in the field of high-definition television; this in association with, among others, the Dutch company, Philips, and the German one, Bosh, for TV sets and studio equipment.

This is good news for Thomson which is said to be getting ready to let its first new generation of TV sets come off its fall production line. The set, baptized 16/9, has a screen diagonal capable of measuring one meter and of receiving not only current television signals but, above all, high-definition ones, with a doubling of the field image and a format comparable to a 35 mm movie. But cameras, transmitters, and transcoders will be needed, together with a totally new generation of transmitting and receiving systems. Needless to say prices will have to be super competitive, for that is where the Japanese are waiting to ambush the Europeans.

The Japanese also have been in the lead for quite some time. As pointed out by an expert: "They are not being confronted by the truly underhanded French-type tactics of the audiovisuals policy." [passages omitted]

#### **Alcatel, Hungary Sign Joint Microwave Venture**

90AN0168 Chichester INTERNATIONAL  
TELECOMMUNICATIONS INTELLIGENCE  
in English 29 Jan 90 p 1

[Article: "Alcatel in Hungarian Joint-Venture for Microwave Transmission Systems"]

[Text] Alcatel has signed a joint-venture agreement, through its subsidiaries, Alcatel ATFH of France and Alcatel SEL of Germany, with Budapest-based Finom-mechanikai Vallat (FMV), in a move which is hoped will strengthen both companies' entry into the microwave transmission market in Hungary and other Comecon countries.

Under the terms of the agreement, Alcatel will hold a 49-percent stake in the newly created joint venture

Mik-Co (Microwave Company), with FMV holding the majority shareholder stake with 51 percent.

Initially, Mik-Co, based in Budapest, will develop sales activities covering medium- and high-capacity analogue and digital microwave systems, rural telephony systems, and urban microwave networks; but future plans include the possible production of microwave equipment.

Back in November 1989, Alcatel SEL (Standard Elektrik Lorenz) took advantage of COCOM trade restrictions, forming another joint venture for the production of System 12 exchanges in Hungary with Videoton, the Hungarian indigenous electronics manufacturer.

## ITALY

### ERS-1, ERS-2 Satellite Projects Discussed

#### Italy's Participation in ERS-1

*90MI0095 Rome AIR PRESS in Italian 8 Dec 89  
pp 2332-2333*

[Text] Italy's share in the ERS-1 [Earth Resources Satellite], the first European satellite designed to study earth resources and the environment exceeds 13 percent. The satellite was developed at the request of the ESA (European Space Agency) and by a consortium that has Dornier as project leader and includes Matra, Marconi Space System, Laben, and Selenia Spazio. The ERS-1 was recently presented in Toulouse, where various tests will be carried out by Interspace, a CNES [National Center for Space Studies] company designed for satellite and spacecraft tests and inspections. The ERS-1 will be transferred to the ESA's Kourou launching site in French Guyana next June. The satellite will be launched with an Ariane carrier rocket in December 1990 and put into a 675-km almost polar heliosynchronous orbit to explore the earth by flying over the same point once every three days. This satellite, which cost almost 500 billion lire, will carry out all its missions with microwave sensors that ensure operations under any light and cloud conditions and permit real all-weather observation of the earth's surface.

Italian participation is particularly important in the payload module. It includes the Along Track Scanning Radiometer (a radiometer that provides information on sea temperatures) and Marconi's AMI (Active Microwave Instrument), which consists of a microwave radar for detailed images of ocean and coastal surfaces and information on the direction of sea winds and wave size and direction. Also included are Selenia Spazio's radar altimeter which also measures wave height, and Laben's IDHT [Instrument Data Handling Transmission]. The IDHT is an instrument that collects, memorizes, integrates, and transmits all the scientific data collected by the instruments to earth. Laben designed, built, and integrated the IDHT system on a 2x1-meter panel which makes up a sizable part of one of the satellite's walls.

Laben informed an AIR PRESS correspondent that the complex nature of the IDHT required its breakdown into a radio frequency system and a data handling system. The former was made in Canada by Spar at Laben's request, and modulates signals carrying collected data in such a way as to ensure their transmission to earth stations on two channels, one high-frequency, and the other low- and medium-frequency. The data handling system was built directly by Laben in Vimodrone (Milan), and performs the fundamental task of data acquisition and formatting, for subsequent transmission to earth at the rate of 100 million bits/s. The system can also record all the data collected during the entire orbit, the equivalent of 6.5 billion bits, into a magnetic recorder. According to Laben: "The system is practically error-free, because it only allows a maximum of one error out of 10 million bits during recording and reproduction operations." Furthermore, the system is equipped with an Intelligent Control Unit, a computer that organizes and manages all of the system's activities and also decides whether to turn off malfunctioning parts and turn on back-up parts. By developing the earth-based testing system, Laben controlled approximately 10 percent of the entire program, amounting to 50 billion lire.

The 70-billion lire radar altimeter built by Selenia Spazio is an innovative piece of radar equipment used for the observation of the topography and dynamics of the ocean and polar cap surfaces. In particular, it is instrumental in mapping currents, determining tide heights, sea conditions (waves and winds), and polar cap conditions, as well as the separation lines between polar caps and oceans, where icebergs are formed. Compared with traditional radar equipment, this instrument ensures more accurate measurements of the required data. When measuring the distance between the satellite and the average ocean surface, it achieves a 10 cm accuracy when the surface conditions are at their worst. The radar altimeter is equipped with an on-board computer, designed and developed by Selenia Spazio, that extracts all the necessary information from the echo signal received and subsequently retransmits this to the earth for further processing or direct use. The radar altimeter's flight unit which successfully passed the acceptance tests, was delivered to the client in June 1989.

#### ERS-2 Project

*90MI0095 Rome AIR PRESS in Italian 8 Dec 89  
p 2333*

[Text] [Box, p 2333]

The ESA is reportedly pressuring the French government to approve and fund French participation (28.5 percent) in the ERS-2, satellite which should eventually replace the ERS-1. Cash-flow problems seem to be the basis for the French delay. The ERS-2 would be similar to the ERS-1, but would also include an experiment to study the ozone layer and, by using all the equipment already developed for its predecessor, is expected to cost half the



amount. Like the ERS-1, it will have three years orbiting life and, if a decision is made by next spring, the program could be started immediately and the satellite could be launched in 1993.

### **New Optical Computing Research Program Under Study**

*90MI0124 Milan ITALIA OGGI in Italian  
30-31 Dec 89 p 32*

[Interview with Mario Martinelli of CISE by Michela Fontana: "Optical Computer Studies in Italy Too;" date and place not given]

[Text] Optical computing (the optical processing of information) or photonics (electronics produced with particles of light called photons) is an area of study which for years has attracted a growing number of researchers worldwide and is now beginning to attract interest in Italy.

A National Research Council committee is currently completing a feasibility study on an all-Italian photonics finalized project which could begin within the next two years in cooperation with the Higher Institute of the Post and Telecommunications.

The project contains, in a broadened form, some of the themes already dealt with in the telecommunications program which is now in the development phase. "Photonics is an important sector which is gaining growing attention worldwide," explained Gianni Fabri of Italtel, president of the committee for the feasibility study and president of the CNR's computer science and technology committee. "It means being able to identify and concentrate on themes which have more applications and industrial importance."

A member of the commission for the feasibility study, Mario Martinelli, who is head of CISE's [Center for Data, Studies, and Experimentation] Segrate-based "coherent optics" department was asked to comment on the project's themes.

**ITALIA OGGI:** Why should Italy concentrate on research themes which are still so far from becoming applications?

**Martinelli:** Even Italy should break into new areas of research rather than catch up on research. The applications of photonics may still seem very distant but even if only a small part of these studies find commercial outlets, the advantages for telecommunications and data processing would be enormous. It would be logical therefore to take a risk and work for the future.

**ITALIA OGGI:** What does photonics mean?

**Martinelli:** This technology is designed to translate into optical terms, by using particles of light called photons, the same type of data signals that are currently processed electronically using electrons.

**ITALIA OGGI:** Where does the interest in this technology come from?

**Martinelli:** Photonics came about as a result of the success of fiber optics. Now, optical fibers account for 99 percent of the new cable installations used for telecommunications.

From this a need arises to process the signals that travel along the fibers optically and not electronically as now occurs. In addition, optical fibers have an enormous band availability which is currently unused but will be in the future. For this reason it will be necessary to develop new optical components that can manage the great flow of information.

**ITALIA OGGI:** What are the themes of the photonics project?

**Martinelli:** Three subprojects are planned: optical switching, transmission, and computing or, in other words, processing.

All of the signal manipulation is carried out in the so-called switching nodes located along the path of a fiber. New architectures and devices must be developed to complete all the operations that take place inside the switching nodes.

Optical switching devices are potentially faster than electronic devices. They can reach speeds of picoseconds which means one trillionth of a second. This is two or three orders of magnitude greater than electronic devices.

**ITALIA OGGI:** What research is planned in the transmission sector?

**Martinelli:** The optical method should be studied, as a means to regenerate and amplify the signal along its course. For example, exploring the new possibilities offered by photon transmission is also important, by investigating how solitons (impulses which remain unaltered even for hundreds of kilometers) propagate.

Another area of research concerns optical connections. Both chips and processing files can be optically connected. Even the different components found within a single chip can be connected optically.

The connections are very important because if they are not developed in response to new processing requirements, they can represent a bottleneck for the signal and force it to slow down.

**ITALIA OGGI:** The last theme concerns the optical computer. What are the advantages of the optical processing of information?

**Martinelli:** The advantages are many. Above all optics allows for parallel processing because of the same kind of signal propagation. It is therefore natural to conceive of using light for new highly parallel architectures such as

neural networks. In addition, optical signals can be easily combined without experiencing cross talk problems that is, without interference.

**ITALIA OGGI:** Why, therefore, with all these advantages, is it so difficult to develop an optical computer?

**Martinelli:** From the early 1960's until the 1970's, analog devices were developed for the optical processing of information. However, electronics, which had experienced continuous progress, always outranked optics. Only in the early 1980's, thanks to the conception of new so-called bi-stable optical devices, did systematic experiments on the digital processing of optical signals begin. This field of study is very promising, even if we are still far from practical applications.

**ITALIA OGGI:** At what stage is photonics research if compared to the development of optics?

**Martinelli:** I would say that we are still at the preliminary stage, but with a great deal of very good ideas to make rapid advances.

#### **Earthnet's Role in ERS-1 Program Described**

90MI0123 Rome AIR PRESS in Italian 3 Jan 90  
pp 33-34

[Text] ESRIN's [European Space Research Institute] Earthnet Program Office (the Frascati-based agency which collects and processes satellite-transmitted data and makes it available to both ESA and nonmember countries for their analysis and interpretation), is preparing to play a key role in the ERS-1 [Earth Resources Satellite] program. The ERS-1 is the ESA's [European Space Agency] remote sensing satellite and will be launched at the end of 1990. Earthnet will provide general services and coordinate the processing and filing of data for ERS-1.

Earthnet's new facilities will allow users to consult the general catalog and the future acquisitions plan. In addition, clients will be able to order products for prompt delivery and request specific observations. The general services, which will remain in operation for most of the next century, could form the basis for a proposed user center for information obtained from observations of the Earth from the polar platform.

Earthnet's activity for ERS-1 will be closely linked to its own network of ground stations and will collect the data transmitted from the satellite when it passes over the covered areas. There are currently three ground stations for data acquisition and processing, in addition to two centers designed to process data from the synthetic aperture radar which will be one of the principal instruments on board ERS-1. The three ground stations, each with very extensive coverage, are: the Fucino-based station at Telespazio which covers Europe, the Middle East, North Africa, and parts of the USSR; Kiruna, in northern Sweden, which ensures the acquisition of data from the North Pole including Iceland, Greenland, and

all of Scandinavia, and the Maspalomas station in the Canary Islands, which covers a large part of Western Africa as far as the Gulf of Guinea.

#### **Telettra's GaAs Technology Reviewed**

90MI0099 Milan TRANSMISSIONE DATI E  
TELECOMMUNICAZIONI in Italian Oct 89  
pp 110-111

[Interview with Gabriele Marzocchi, director of Telettra's Central R&D Division by TRANSMISSIONE DATI E TELECOMMUNICAZIONI; date and place not given]

[Text] We interviewed Gabriele Marzocchi, director of Telettra's central R&D division, to gain a better understanding of the strategic importance of GaAs technology for the telecommunications industry and to assess the industry's response to this technology. The Telettra telecommunications company holds a very large market share in Europe, and plays a major role in sectors such as radio systems and fiber-optic communications. Unlike many other companies in this sector, Telettra has taken an active interest in GaAs technology. Telettra's opinion was that, in spite of the heavy investments required, the in-house production of devices based on GaAs technology could be of considerable advantage to the company with respect to its European and non-European competitors.

**Question:** What is the importance of GaAs technology for Telettra?

**Marzocchi:** GaAs technology currently plays a key role in determining the cost, reliability, and performance of our transmission systems. The main factors behind our decision to engage in this activity in 1983 were essentially strategic. In practice, we refused to depend on our Japanese competitors. We currently rank among the leading users of GaAs devices in the telecommunications industry. Other factors were related to production volume and the desire to seize the opportunity of the availability of qualified personnel on the market. This personnel had a specific know-how and had been involved in research at CISE [Center for Data, Studies, and Experimentation], which was then about to close. This triggered an R&D investment plan, which led to the current in-house production of GaAs devices that are required to develop the equipment we intend to market.

**Question:** What steps have you taken over the years to develop that capability?

**Marzocchi:** Obviously, one fundamental decision was to allocate a portion of R&D investments directly for this purpose. However, in addition to this in-house commitment, a basic role was assigned to cooperation with research institutes and universities (the national Microelectronics Plan and the MADESS finalized plan were important. This enabled us to speed up research by sharing our efforts with others. For this reason we

promoted international meetings such as the International Workshop on GaAs technology in telecommunications. The objective of these international meetings is to coordinate the people most involved in GaAs research and to create a comparison between industry, universities, and research institutes. While GaAs research in the United States has fallen into disuse, Japan is very active in the field. Thanks to this commitment, Telettra holds a leading position in Europe.

**Question:** To what extent does GaAs technology affect Telettra's equipment production?

**Marzocchi:** This year Telettra further increased its worldwide production of terminals for optical fibers and radio transceivers. These are devices which make considerable use of GaAs technology. Approximately 50,000 GaAs devices—including discrete and integrated devices—are currently being used. However, we expect the figure to increase to approximately 100,000 GaAs devices per year over the next few years, with IC's accounting for an increasingly larger share (the use of IC's is expected to increase from 10 to 40 percent).

**Question:** But what is the basic advantage of this strategy for Telettra?

**Marzocchi:** One advantage is the ability to develop increasingly fast transmission devices, as required by the new communication technologies and market demands. The application of in-house GaAs components in our transmission devices has enabled us to make a major shift toward high transmission frequencies ranging from

18 to 23 GHz and, in the near future, more than 30 GHz and toward 2.4 Gbit/s rates. Another important advantage stems from the ability to develop solid-state circuits by setting up a GaAs foundry within the company. This means that we no longer have to wait for the telecommunications component industry to launch the MMIC's (microwave monolithic integrated circuit) we need onto the market. This gives us the opportunity to develop advanced, high-speed transmission equipment according to market requirements.

**Question:** What are the most important technological results achieved by Telettra in the in-house production of GaAs devices?

**Marzocchi:** The efforts made over the last few years to pass from laboratory research to the development of GaAs components paved the way for the successful production of high-quality control and automation wafers. The result is good quality production with excellent product quality and performance. The results in terms of reliability, for example, have been very satisfactory. In the field of discrete devices, we currently manufacture high-frequency MESFET's [metal semiconductor field-effect transistor] (23 GHz and, shortly, 30 GHz) with highly advanced technological characteristics as well as high-power MESFET's (8 W at 8 GHz). The development of GaAs analog IC's marks another major breakthrough. These circuits are capable of operating at up to 3 GHz with a direct current, and are, therefore, suitable for applications in fiber-optic systems at 2.4 Gbit/s and from 2 to 20 GHz for radio applications.

Comparison of the Properties of GaAs and Silicon

	GaAs	Silicon	Importance
Energy gap	1.4	1.1	optical properties
(eV)	(direct)	(indirect)	
Concentration of intrinsic carriers	$2 \times 10^6$	$1 \times 10^{10}$	semi-insulating
( $\text{cm}^{-3}$ )			
Intrinsic resistivity	$4 \times 10^8$	$4 \times 10^5$	high insulation
(ohm-cm)			
Electronic mobility	6,000	1,000	high speed
( $\text{cm}^2/\text{V-s}$ )			
for $N=10^{17}/\text{cm}^3$			
Thermal conductivity	0.5	1.4	high circuit density
( $\text{W}/\text{cm}^2\text{C}$ )			
Saturation pressure at 1,000°C (torr)	1	$10^{-8}$	possibility of high-temperature 'processing'

### Telespazio's Role in Olympus Satellite Operations

90MI0083 Rome AIR PRESS in Italian 24 Nov 89  
p 2255

[Text] Telespazio of the IRI/STET Group [Institute for the Reconstruction of Industry/Turin Telephone Finance Company] has taken over the direct and exclusive orbital control of the European Olympus satellite launched from

the Kourou space center in French Guyana on 12 July 1989. This follows a period of cooperation with the ESA's (European Space Agency) Darmstadt control center. All of Olympus's functions will be directed by a special control center installed at Telespazio's Fucino-based space center. The center houses a parabolic antenna that measures 11 meters in diameter and a telemetry, control, and positioning station to code and decode the signals used for

communications between the satellite and the mission's data processing center. The data processing center has two large computers which contain all the software needed to control its operations.

The control center will direct the satellite for the five years of its working life. Its functions include: reception and real-time processing of the satellite's telemetric signals, sending commands to change the configuration of systems on board, and locating the satellite through angular measurements. In addition, the orbit and attitude of the satellite can be determined, and the maneuvers necessary to keep the satellite in its correct orbiting position can also be carried out by using the propulsion system on board. RAI (Italian Broadcasting Corporation) will use one of the two television channels as soon as possible to start live television experiments with an antenna that will transmit to the satellite. Telespazio is currently installing the antenna at RAI's Rome center.

Telespazio will also direct the experimental telecommunications and propagation program using Olympus's 20-30 Ghz and 12-14 Ghz bands. This program is being carried out with the support and coordination of the ISPT [Higher Institute of Post and Telecommunications] and the ASST [State Telephone Services Agency]. Numerous other Italian scientific institutes are participating in the program which aims to carry out experiments in these frequencies. These experiments are very important for both traditional telecommunication services and for the development and diffusion of "new services" to commercial users: multiple videoconferences, tele-education, local area interconnections, atomic clock synchronization, mobile radio communications, etc.

According to Telespazio's note to AIR PRESS, the use of the 20-30 Ghz band creates serious problems due to the strong dampening effect in the earth-satellite exchange caused by climatic conditions, especially rain. Those involved in the experiments are mainly interested in verifying the feasibility of overcoming the technical difficulties caused by climatic conditions to obtain better connections. Eleven earth stations are being established in Italy to carry out all the projected experiments. Four of these are owned by Telespazio and will guarantee the operation of all the stations.

## PORTUGAL

### Need for Spanish Pact on TV Channels Noted

90WT0070A Lisbon O JORNAL in Portuguese  
30 Mar 90 p 11

[Article by Filipe Luis—first paragraph is O JORNAL introduction]

[Text] There is no current intention of opening a fourth channel and the RTP [Portuguese Radio and Television]

has already occupied the third. Nothing will be accomplished if we do not negotiate the radioelectric situation with Spain...

The opening of two private channels will substantially alter our plans with regard to the national television broadcasting system. While the politicians and legislators are discussing charters and regulations, the technicians are turning up their nose: the national plan for the fourth channel does not exist nor, in fact, will it be implemented without difficult negotiations with Spain.

Meanwhile, the RTP lost no time and, throughout the years, used frequencies attributed to Channel 3. There is total confusion. Private television, yes, but slowly. In the best hypothesis, not until two years from now.

As early as January 1988, Socialist Deputy Arons de Carvalho made an inquiry in which he asked if negotiations with Spain on behalf of Portugal would lead to the use of frequencies involved in Channel 4. He received no answer. The same deputy now accuses the government of "premeditated carelessness." A technical source associated with O JORNAL revealed that "before the negotiations with Spain there must have been a plan; well, it did not exist..."

The third channel is already using some frequencies provided by RTP's two channels. This is the case of the Palmela transmitter which is using one of the frequencies of the third transmitting system. Spain, in turn, has a national network of five broadcasting systems, with emitters distributed throughout the border with Portugal. Although the attribution of a third channel will in essence interfere with the current positions of the RTP, the fourth channel hardly has room to exist. Everything depends on a combination of network channels to be worked out in harmony with "our brothers" within the framework of the International Union of Telecommunications [UIT]. And none of this is accomplished or even started. In short, we have to shuffle and deal again.

Meanwhile, none of the channels should try to operate without the other. This situation would seem to favor the one who got out in front, living up to certain norms, arranging schedules, and capturing the share of the advertising market.

### Battle of Distribution

The battle for the distribution rights has already begun. Presently, the distribution rights are the property of the RTP. In the future, either the emissions are to be made by transmitters and channels close to those of the RTP or the TV viewers will have to spend 30 million contos for new antennas. In this regard, there is already talk of the hypothesis of using a satellite.

The Marconi company has already made a satellite available for use by one channel. In this process, the emission is sent by a satellite and from there to the normal retransmitters of one of the private channels. In

this manner, the viewers would receive a satellite emission without the need of a parabolic arrangement...

But there are two roosters for one roost. And if this is the solution of the future, the present demands that the transmission of the four channels be made by land distribution. Not being appropriate for the RTP to establish a signal which is also used by the competition, there should be a company with mixed share capital holding the rights to the property in question.

Marconi, RTP, and CTT [Portuguese Post and Telecommunications Office] are three companies in the race for leadership of the consortium. But one should not forget the part played by other interested parties, the future users of the network.

## UNITED KINGDOM

### BAe To Test New Telecom Switching System

90AN0149 Chichester *INTERNATIONAL TELECOMMUNICATIONS INTELLIGENCE*  
in English 15 Jan 90 pp 7-8

[Text] A spaceborne telecommunications switching system that could improve the efficiency of communications satellites by up to 10 times is being readied for trial by British Aerospace Systems Ltd. According to Tony Craig, BAe Communications Division group leader, the new system will provide the key to satellite communications to mobile receivers—including those mounted on ships, aircraft, land vehicles and other satellites and spacecraft. He says the increased efficiency offers the options of using less directional and more economical receiving antennae or low-power and lighter satellite transmitters.

Two techniques are employed, each of which improves a satellite's traffic handling capacity. The most significant advance is the use of a purpose-designed complex integrated circuit that acts as a high-speed digital demultiplexer and filter. This allows specific signal channels to be isolated from a frequency division multiplexed broadband up-link so that it can be reprocessed at baseband frequency on board the satellite. That allows regeneration of the signal to remove noise and distortion. If necessary it can be recoded to a different protocol or data transmission rate.

Craig explains that, conventionally, a communications satellite is "transparent" to the traffic passing through it. "A multiplexed signal is transmitted to the satellite from the ground, amplified, maybe changed in frequency, and then broadcast towards the receiver." So any distortion or noise generated and added to the wanted signal during its journey into space is amplified along with the wanted signal, and further noise and distortion will be gathered on the down-link. To ensure that a good signal is received on the ground, high-power transmitters or highly sensitive ground receivers must be used.

"Regeneration of the signal onboard the satellite gives improved signal-to-noise ratios by around 3 dB," Craig insists.

Onboard demultiplexing and signal processing adds a further bonus in allowing full use of multiple-beam antennae systems. Such a system mounts a number of narrow beam transmitting antennae on a satellite rather than a single antenna that broadcasts signals over a wide area of the Earth's surface.

"It's analogous to the difference between using a floodlight or several spotlights to illuminate the objects in a room," Craig says. To get the same amount of light to fall on all the objects using a floodlight would consume far more power than simply aiming a single spotlight at each. On a multi-beam communications satellite, once the up-linked signals have been demultiplexed, they can be switched to the particular antenna whose footprint covers the location of the addressee.

At the heart of the switching system is a 20,000-gate radiation hardened, digital signal processing array made with a CMOS on Sapphire technology developed by Marconi Electronic Devices Ltd of Lincoln. The device is configured as a two-stage infinite impulse response digital filter and integrated mixer. Functionally, it comprises four multiplier accumulators, five memory elements and a microprocessor interface. Ten-bit arithmetic is used to perform 20 million multiplications a second to give an overall data sampling rate equivalent to one million samples a second.

British Aerospace expects the first system to fly in space in the next two years. It is also prepared to take orders now for regenerative payloads based on the switching system.